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WESTERN REGION FORECAST OFFICE FIRE WEATHER SERVICES

OPR: W/WR1x3 (R. Lamoni)

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Signed

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Vickie Nadolski

Date

Director, Western Region

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1. Introduction: The National Oceanic and Atmospheric Administration's (NOAA) Fire Weather Program is one of the most important programs managed by the National Weather Service (NWS), providing critical forecasts and guidance to fire and emergency management agencies from the local to the federal and international level. During periods of high wildfire danger, fire weather can be the most important program for a Western Region (WR) Weather Forecast Office (WFO). Meteorologists In Charge (MIC) should ensure that WFO operations during fire season adequately address this importance.

Because of the variety of customers and to allow local flexibility, absolute requirements for all aspects of the fire weather program have not been developed. It is imperative that the WFO work closely with their local fire weather customers to determine local application of national directive and regional supplement guidance. Further, standardization of fire weather products and services from several WFOs across the jurisdiction of a Geographic Area Coordination Center (GACC) should be done as much as possible and reflected in the local NWS/GACC Annual Operating Plan (AOP).

2. Fire Weather Products: Like all NWS products, fire weather forecasts and warnings are continuously evolving with technology to provide the best information for our fire weather customers. It is important that fire weather products remain consistent with other forecast products, text and graphic. At a minimum, fire weather forecast elements will meet the inter-WFO collaboration thresholds outlined in NWSI 10-506. When all parties agree, AOP collaboration requirements may be tighter and may be assigned to those elements without national standards.

2.1 Fire Weather Planning Forecasts (FWF): The Fire Weather Planning Forecast remains one of the flagship products of the fire weather program.

- a. Issuance Times. During "high fire season", typically the late spring and summer months in WR, the FWF will be issued at least twice daily. During "low" or "off season", and depending on customer request, the FWF should be issued at least once per day, usually with a reduced number of forecast elements. To reduce the number of fire weather-related products from the NWS, the FWF product should be utilized year-round rather than issuing a Land Management Forecast (FWL) during the off-season.
- b. Headlines. In addition to required Fire Weather Watch and Red Flag Warning Headlines, headlines for critical fire weather events that do not reach Red Flag criteria are very useful for fire weather customers. Because of possible confusion when fire weather forecasts are read over agency radio broadcasts, the phrase, "Near Red Flag Conditions" will not be used; rather, describe the actual weather element(s) that may be problematic for fire agencies. For example, "GUSTY NORTH WINDS AND LOW HUMIDITY THURSDAY MORNING".
- c. Sky/Weather. All parties to an AOP must agree to drop the term "widely scattered" from fire weather forecasts products. If agreement cannot be reached,

the term “widely scattered” will be kept in forecast products. “Widely Scattered” remains an official term for the National Wildfire Coordinating Group (NWGC).

- d. Extended Period. During high fire season, the FWF 3-5 (7) day extended forecast period will be coordinated with the GACC Predictive Service Unit (PSU) for the County Warning Area (CWA). Fire agencies make expensive resource positioning decisions based on the 3-5 (7) day forecast. Many fire fighting resources are already committed to an area by the time a Fire Weather Watch or Red Flag Warning is issued. This is especially true with dry thunderstorm forecasts.
- e. Optional Elements. Inclusion and definition of optional elements as described in NWSI 10-401 should be coordinated between WFOs and fire weather customers across a GACC or statewide area.

2.2 Red Flag Warning / Fire Weather Watch (RFW): Headlines for these products will include “what, where, why and when” in compliance with national policy. The same headline will be used in the applicable zone in the FWF and applicable spot forecasts. Watch or Warning issuances will be coordinated with the GACC servicing a WFO CWA to ensure that fuel moisture is adequately considered depending on the season and time of year. For example, from NWSI 10-401, “...RED FLAG WARNING FROM 2 PM TO 7 PM MST FOR STRONG WINDS AND LOW HUMIDITY FOR SOUTHEAST OREGON...and ...FIRE WEATHER WATCH REMAINS IN EFFECT FOR THURSDAY FOR DRY LIGHTNING ACROSS SOUTHEAST OREGON...”.

2.3 Site-Specific (Spot) Forecast (FWS): The spot forecast, although used primarily for prescribed burn and wildfire support, is also applied to “all-hazard” incidents. The WFO Fire Weather Program Leader (FWPL) and Warning Coordination Meteorologist (WCM) work together to ensure uses of the spot forecast are known to all local first response and emergency management agencies. The National Digital Forecast Database (NDFD) based “NWS Spot” will be used as the primary means by all WR offices to fulfill spot forecast requests. In the event of that the AWIPS/NDFD portion of NWS Spot fails the web interface can still be used to generate spots manually. If all software fails, faxing the D-1, “Spot request Form”, is a further back-up. Agencies requesting spot forecasts will be advised to use decimal latitude and longitude coordinates to define the location of an incident rather than Township and Range coordinates.

To reduce workload of increasing spot forecast requests, offices will implement the NDFD-based “Weather Planner” for optional use by fire agencies and others needing guidance for prescribed burns or other operations in the 3-5 day forecast period. For prescribed burns and other land management projects not covered by a Burn Plan or similar document, fire agencies and other customers should be encouraged to utilize the “Weather Planner” beyond 48 hours. On a “Weather Planner” web page as well in all fire weather outreach, offices will emphasize that “Weather Planner” does not replace a detailed spot forecast.

2.4 National Fire Danger Rating System (NFDRS) Forecasts (FWM): Where agreeable to local fire weather customers and the GACC, the GFE formatter will be used to generate a first

draft of NFDRS forecasts. This grid-based draft will then be edited by the forecaster based on available fire weather observations before dissemination.

2.5 Area Forecast Discussion (AFD): As outlined in NWSI 10-503, a fire weather section may be added to the narrative portion of the AFD. A fire weather AFD section can be used to disseminate content of the FWF discussion earlier which could be of useful to both the WFO and fire weather customers during high fire danger season. The use of this option should be publicized with local fire weather customers at pre-season meetings. Remember that listing RFW issuances in the watch/warning portion of the AFD is mandatory.

3. Verification and Quality Control:

3.1 Standards and Goals: WR fire weather products are critical to the NWS primary mission of protection of life and property. Quality control of these products is paramount to providing the highest quality products to all fire weather customers. All fire weather products will be quality checked by a forecaster prior to dissemination.

Verification of the fire weather products is part of the national verification program as outlined in NWSI 10-1601. WR WFOs will perform minimum routine fire weather product verification as detailed below. Additional verification may be performed by local agreement and clarified in the AOP. All verification data shown below will be included in WFO Fire Weather Annual Reports.

3.2 Red Flag Warning and Fire Weather Watch Statement (RFW):

a. Verification.

Fire Weather Watch - Track the number of total watches issued and the number of watches that were followed by Red Flag Warnings.

Red Flag Warnings - FAR, POD, CSI and Lead Time are calculated for warnings as defined in NWSI 10-1601. Verification statistics will be maintained separately for the number of warnings issued due to (expected) dry thunderstorm events and warnings issued for (expected) synoptic events (i.e., wind and low humidity). Exact Red Flag criteria will be clearly defined in the AOP. Annual goals for FAR, POD, and CSI will be listed in the WR Annual Operating Plan and should be reflected in WFO Annual Operating Plans.

Regional RFW annual verification goals are listed in Appendix B.

b. Quality Control.

The error-rate of Red Flag Warnings can be reduced by performing the following checks prior to issuance:

- (1) If issuing a Red Flag Warning, make sure there are no reference to a Fire Weather Watch in the statement and vice-versa for Fire Weather Watch statements. Be especially cautious if editing a previous RFW statement.
- (2) Review the UGC line to ensure appropriate zone coding and expiration time.
- (3) Has the main headline answered the following required questions: “What”, “Where”, “Why”, and “When”?
- (4) Keep track of what watches or warnings are in effect for your CWA, especially when coming on shift.

3.3 National Fire Danger Rating System (NFDRS) Forecast (FWM):

a. Verification.

It is anticipated that verification of NFDRS station forecasts will be accomplished in large part by automated NDFD verification procedures. Until that time, local NFDRS verification should be performed in cooperation with parties to an AOP.

b. Quality Control.

Before sending the FWM forecast, ensure any last minute adjustments to temperature and humidity trends/forecasts are reflected in the 10-hour fuel moisture forecast. Ensure there are no Lightning Activity Level (LAL) forecasts of “zero” and that other parameters are consistent with the FWF.

3.4 Fire Weather Planning Forecast (FWF):

a. Verification.

Nascent NDFD verification will be used as FWF verification.

b. Quality Control.

- (1) Ensure that headlines are appropriate and answer the four questions: “What”, “Where”, “Why”, and “When”. For example, “Red Flag Warning in Effect until 2 p.m.” is not a sufficient headline.
- (2) Weather conditions forecast within particular zones or zone groupings must agree with any existing RFW statements and should closely reflect public forecasts.

- (3) Review LAL and Chance of Wetting Rain (CWR) forecasts to ensure they agree with the sky/weather forecasts.

3.5 Spot Forecasts (FWS):

a. Verification.

Until evolving NDFD verification can assist in FWS verification, local observations will be used to verify spot forecasts as needed. Forecaster evaluation as defined by the need to update a spot forecast is also a qualitative method of verification.

b. Quality Control.

Frequent spot forecast requests, especially during Red Flag and/or large wildfire events, may result in the need for an additional person to help review and quality control forecasts prior to dissemination. Further, forecasters should anticipate the number of spot requests they may encounter on shift. Beginning each shift, forecasters will determine what spot forecasts may be due the next few hours, including reviewing spot requests from the last 24 hours or so. Do not rely solely on the AWIPS spot request alarm or a phone call from the customer; check the spot request web page periodically. Requested spots will be logged and monitored so none are missed.

4. Annual Operating Plans (AOP): WR AOPs normally represent a statewide or GACC-wide area and thus comprise the fire weather responsibility of several WFOs. The State Liaison Office (SLO) normally provides the NWS AOP Team Leader as defined in NWSI 10-404. If more than one SLO is covered by an AOP, NWS AOP Team Leader responsibilities will rotate through the SLOs. A sanitized AOP should be made available on the Internet no later than May 1.

5. Annual Reports: WR WFO Fire Weather Services Annual Reports will be submitted to the WR Fire Weather Program Manager no later than January 15th following the previous fire season. In addition to minimum Annual Report content outlined in NWSI 10-404, WR offices will provide the number of Fire Weather Watches that were followed by a Red Flag Warning. Per Section 3.2 above, Fire Weather Watches and Red Flag Warnings issued due to dry thunderstorm events will be tracked separately from those products issued for synoptic events.

WFOs will coordinate with fire weather customers to determine the need for other information included in Annual Reports, such as monthly fire season weather summaries and cooperative projects with fire agencies. This type of information can be quite useful not only to the NWS fire weather program and fire agencies but also to emergency managers, climatologists, universities and the media. (Sanitized) Annual Reports will be posted to and accessible to the public from the WFO fire weather web page.

6. Customer Service and Outreach: Wildfire in the urban-wildland interface is one of the top hazards for many emergency managers across the West. The fire weather program is therefore an integral part of WR WFO outreach and preparedness activities. The WFO management team must be actively involved in the local fire weather program. The WCM should assist and advise the fire weather program leader with outreach to local fire weather customers. Consider inviting local fire weather customers to spotter training, open houses and other outreach activities.

As with other major events, procedures will be in place at each WFO to provide efficient and coordinated information from the NWS and wildland fire agencies to the media and emergency managers during major fire outbreaks, especially near large metropolitan areas and/or recreation areas. WFO staff, especially management team members, may be asked to assist a nearby GACC or interagency dispatch center with this information dissemination. The WFO should fulfill these requests.

6.1 Customer Meetings: WFOs, especially SLOs, will meet at least annually with the GACC and PSU that has responsibility in the CWA. If a WFO is located in the same city as a PSU, additional meetings are encouraged for familiarization between agencies, to exchange ideas for product and service improvement, to prepare for AOP meetings and other purposes. Similar meetings with local fire weather customers including interagency dispatch, coordinator groups and land managers are strongly encouraged. A joint presentation to local customers by WFO and PSU representatives to review products and services from each organization reduces confusion and promotes cooperation. Consider organizing a visit by WFO staff to a prescribed burn or wildfire. Consider post-season review meetings in addition to pre-season AOP meetings as good planning venues with customers.

6.2 Pre-Season and End of Season Notification: Following an AOP spring planning meeting, a “pre-season” letter may be sent to local fire weather customers. If used, this letter should provide a brief summary of NWS fire weather operations for the upcoming “high season”, highlighting any product and service changes. The letter should also include a formal offer to visit the customer and/or have the customer visit the WFO.

Similarly, an “end of season” letter may be sent to customers providing the proposed date at which a WFO will switch to “low season” fire weather products and services, with a reminder that spot forecasts are always available. If used, this letter should encourage off-season visits and communication to improve services and customer response for next year.

7. WFO Training: In conjunction with the WFO Management Team, the following training will be provided:

7.1 Pre-Season: Following the spring AOP meeting, pre-season refresher training will be provided to the forecast staff. One option is for the WFO FWPL and/or Science and Operations Officer (SOO) to present a seminar to the forecast staff. This seminar may include a review of fire weather forecast problems in the local area, any operations changes for upcoming high season and any other updated procedures. A presentation to the staff from a local fire customer is

also an option. A seminar may be followed by a review/refresher exercise to be completed by appropriate staff.

7.2 Post-Season: A review of the concluded “high season” should be presented to the forecast staff. This review should include verification, lessons learned, any persistent problems in products or services and any changes in “low season” operations. One or more local fire weather customers can also participate in this review.

8. Fire Weather Service Back-Up: Due to equipment failure, severe weather, staff shortages or other reasons, a WFO may need to request service back-up for their fire weather program as discussed in WR Supplement 18-2003. WFO service back-up plans for fire weather will be documented. When service back-up is required and depending on communications capability, either the WFO requiring back-up or the WFO assuming responsibility will notify the GACC and/or interagency dispatch centers by telephone of the situation. Customers will also be notified when operations return to normal.

- a. Fire Weather Manual Web Posting: In order to facilitate easy exchange of specific fire weather program information, each WFO will submit an electronic version of the local Fire Weather Manual to WR Meteorological Services Division (MSD) for posting on the WRH secure web site. The Fire Weather Manual should be submitted in either Word© or Adobe PDF© format. Fire Weather Manuals will be submitted for posting whenever significant changes are made to a WFO fire weather program.
- b. Service Back-Up for Spot Forecasts: For short term problems, faxing of completed NWS Spot Forecast Request Form D-1 will be the primary means of providing spot forecast service back-up. For outages expected to last more than 72 hours, the following procedure should be used to allow another WFO to provide spot forecast request service back-up:
 - (1) Determine the Internet Protocol (IP) address(es) of the PC(s) in the WFO(s) that will provide service back-up.
 - (2) Provide the IP address(es) to Art Thomas (art.thomas@noaa.gov) who will then edit access configuration files to NWS Spot. This may be done ahead of time for planned outages (equipment maintenance, etc.)

9. Incident Meteorologist (IMET) Services: On-site IMET forecasting is one of the most critical and valuable services provided by the National Weather Service. IMET services are considered a national NOAA/NWS resource.

9.1 Availability: Sans preexisting dispatches and staffing shortages, WR WFOs with two FTEs assigned for fire weather should have one or more IMETs available for immediate dispatch during high fire season. IMETs will maintain status of their availability for dispatch on the WRH fire weather page (<http://ww2.wrh.noaa.gov>) for use by the National Fire Weather Operations Coordinator (NFWOC).

During critical wildfire periods, usually when the National Interagency Fire Center (NIFC) is in National Preparedness Level 5 for an extended period, WRH and/or National Weather Service Headquarters (NWSH), may require all IMETs be made available for immediate dispatch.

9.2 All Hazards Meteorological Response System (AMRS) Replenishment: Each WR WFO will provide routine maintenance and supplies restocking of their AMRS unit(s). At least annually, and especially prior to high fire season, the IMET(s) at a WFO will ensure operability of the AMRS unit(s), including the IMET cellular telephone(s). Any deficiencies will be reported to the MIC for resolution prior to a dispatch of the AMRS unit(s). Some specialized AMRS parts must be procured with assistance from WR MSD and/or the NFWOC. If an AMRS problem occurs at an incident, simple AMRS parts and supplies can be provided by incident officials. Similar procedures are used for the Atmospheric Theodolite Meteorological Unit (ATMU). Further information, including an equipment checklist, can be found in the IMET Handbook.

9.3 Safety and Personal Protective Equipment: Personal safety is the highest priority in all aspects of IMET response, including travel to and from an incident. IMETs are not required to perform activities that are classified as “hazardous” (i.e., trip to the fire line are considered voluntary). If an Incident Commander (IC) and/or Fire Behavior Analyst (FBAN) recommends that an IMET visit a fire line or similar reconnaissance, it is the IC’s or FBAN’s decision on whether to grant reimbursable hazard pay.

Because there are no required IMET duties that are officially defined as hazardous, and as IMET service is a temporary employee status, the NWS cannot purchase boots or other protective footwear for IMETs with appropriated funds. Other required IMET personal gear, including camping equipment and fire retardant clothing, can be purchased through the GSA “Wildland Fire Equipment Catalog” or supplied at an incident. If IMET equipment purchases are made using WFO funds, the equipment remains property of the government.

9.4 Reimbursable IMET Expenses: Most costs associated with the dispatch of an IMET to a wildfire or prescribed burn, including associated WFO overtime, are reimbursable from the served agency as described in NWSI 10-406. States in WR that have a large demand for IMET services provide similar reimbursement through a “Task Order”. California, Oregon and Washington currently have task order agreements for NWS IMET services. Specific IMET reimbursement procedures are outlined in the WR document, “Fire Timekeeping”.

10. Burn Area Flash Flooding: Intense wildfires can consume most vegetation in a given area, leaving behind bare earth and ash that is usually “hydrophobic”. Flash flooding is a threat following most large fires (> 100 acres as defined by the land management agencies). Rainfall threshold rates which can result in flash flooding from burn areas are well below typical rates used for vegetated slopes and can be less than .25 inches per hour. The flash flood threat from a specific burn area is dependent on many parameters including slope, aspect, location and other antecedent conditions. A flash flood threat can be dramatically high for several years after a wildfire, until re-vegetation stabilizes the burn area.

WFOs will confer with affected fire and land management agencies, the USGS and emergency managers to assess this threat and determine rainfall threshold rates. The WFO will coordinate with the River Forecast Center (RFC) to determine if improved guidance can be provided for the burn area(s). Warning, notification and other interagency cooperative procedures should be established prior to a burn area flash flood event. Fire agencies or a GACC may have GIS-based burn area maps that can be used as background maps on AWIPS. These maps can be used with radar precipitation overlays to assist in flash flood warning operations.

Other events can be triggered from rainfall on burn areas, including land failure, debris flows and sloughs. Some of these events may not be highly liquefied and may occur over a time span longer than 6 hours. Those events may not satisfy the NWS definition of flash flooding and forecasting these events is not a NWS responsibility. However, as an “all-hazards” warning agency, the NWS may relay emergency information from other government agencies regarding these threats. Use of the Civil Emergency Message and resultant EAS activation is authorized as appropriate. Specific mention of the originating agency must be included in these products.

On relatively new burned areas (2 years old or less), debris flows are a common threat. It can be difficult to distinguish between flash flooding and debris flows. In these cases, NWS forecasters must use their best judgement to determine the type of threat. They can mention the threat of both flash floods and debris flows in their products. Protection of life and property are the primary factors to consider when making this determination.

For especially damaging wildfires, a land management agency may establish a Burn Area Emergency Rehabilitation (BAER) Team. BAER Teams are formed after major fires to assess damage caused by the fire and to implement a rehabilitation plan that will prevent loss of life and property and reduce further natural resource loss. BAER Teams are composed of highly skilled wildlife biologists, archaeologists, soil scientists, landscape architects, geologists, ecologists, engineers, foresters, botanists, GIS and GPS specialists and other disciplines from all over the nation. A BAER Team can greatly assist a WFO in determining the flash flood threat from a burn area. Information on BAER teams should be obtained from a GACC.

APPENDIX A

Suggested WFO Annual Fire Weather Program Checklist

Preseason

- ☐ Fire Weather Program Leader (FWPL) and WCM or MIC participate in Annual Operating Plan (AOP) meeting and adjust office program accordingly. Provide link to AOP from office fire weather web page.
- ☐ Update Fire Weather Station Duty Manual and all references/procedures as needed.
- ☐ FWPL and WCM/MIC visit local fire customers, especially interagency dispatch offices.
- ☐ FWPL/SOO present review/refresh seminar to staff. Fire customer representative presents seminar on local fire problems and importance of program.
- ☐ WFO Open House for fire weather customers.
- ☐ Staff completes annual fire weather review exercise.
- ☐ Test product dissemination and service back-up.
- ☐ Incident Meteorologist (IMET) reviews All-Hazards Meteorological Response System (AMRS) set-up and ensures operability. Cell phone tested. All incident supplies replenished. Approximate IMET availability schedule placed on appropriate web page.

During High Season

- ☐ Products archived per Directives and local needs.
- ☐ Products verified per Directives and regional requirements.
- ☐ Interagency coordination done as required by AOP and local needs.
- ☐ IMET availability kept current.

Post Season

- ☐ Complete and publish Annual Report by January 15. Provide link to Report on WFO fire weather web page.
- ☐ FWPL and WCM/MIC meet with local customers to review services, determine any adjustments needed and proposals for next AOP meeting.

APPENDIX B

Annual Western Region Red Flag Warning Goals

For 2005, the following Regional RFW verification goals have been established:

Synoptic Event Based Red Flag Warnings (winds, low RH)

POD: 91 FAR: 27 CSI: 68 Lead Time: 9.8 hours

Dry Thunderstorm Based Red Flag Warnings

POD: 70 FAR: 50 CSI: 50 Lead Time: 6 hours